

Amendments to the Claims:

1. **(Currently amended)** A hip joint prosthesis comprising a load bearing portion and a mating portion that define a cavity and a head articulated to provide motion such that θ_{\max} is about 60° to about 135° , wherein at least one of the bearing portion and the mating portion comprises wear resistant radiation treated ultra high molecular weight polyethylene polymer that resists embrittlement ~~polymer having substantially no detectable free radicals~~, wherein the head cross-section is about 35 mm to about 70 mm, and where the thickness of said polymer is about 1 mm to about 5 mm.

2-36. (Cancelled).

37. **(Currently amended)** A surface replacement hip joint prosthesis comprising:

a. an acetabular cup that includes a load bearing portion and can embrace a femur cup; and

b. a femur cup that has a mating portion and defines a cavity to accommodate a femur head, wherein the head cross-section is about 35 mm to about 90 mm;

wherein at least part of the acetabular cup and femur cup comprise wear resistant cross-linked ultra high molecular weight polyethylene (UHMWPE) that resists embrittlement, wherein the thickness of the cross-linked UHMWPE of the acetabular cup and femur cup is about 1 mm to about 20 mm.

38. (Previously presented) The prosthesis of claim 37, wherein the thickness of the cross-linked UHMWPE of the acetabular cup and femur cup is between about 1 mm to about 5 mm.

39. (Previously presented) The prosthesis of claim 37, wherein the thickness of the cross-linked UHMWPE of the acetabular cup and femur cup is between about 5 mm to about 8 mm.

40. (Previously presented) The prosthesis of claim 37, wherein the thickness of the cross-linked UHMWPE of the acetabular cup and femur cup is between about 8 mm to about 10 mm.

41. (Previously presented) The prosthesis of claim 37, wherein the femur cup is metallic.

42. (Currently amended) A surface replacement hip joint prosthesis assembly comprising:

a. a metallic acetabulum shell, wherein the shell can be fixed to the pelvis to be disposed to be in contact with an acetabular cup;

b. an acetabular cup that includes a load bearing portion and can embrace a femur cup; and

c. a femur cup, that has a mating portion and defines a cavity that accommodates a femur head, wherein the head cross-section is about 35 mm to about 90 mm;

wherein at least part of the acetabular cup and femur cup comprise wear resistant cross-linked ultra high molecular weight polyethylene (UHMWPE) that resists embrittlement, and wherein the thickness of the cross-linked UHMWPE of the acetabular cup and femur cup are about 1 mm to about 20 mm.

43. (Currently amended) A hip joint prosthesis comprising:

a. ~~[[an]]~~ a cross-linked UHMWPE acetabular cup to embrace a ball head, wherein the acetabular cup comprises that includes a load bearing portion~~[[,]]~~ and a mating portion, ~~and can embrace a ball head,~~ wherein the cup comprises wear resistant cross-linked UHMWPE that resists embrittlement, and wherein the thickness of the cross-linked UHMWPE of the acetabular cup is about 1 mm to about 20 mm; and

b. a ball head which has a radius of curvature complementary to the cavity in the acetabular cup, wherein when the ball head can be embraced by the said acetabular cup forms an articulation to provide motion such that θ_{\max} is about 60° to about 135° , and wherein the head diameter is about 35 mm to about 70 mm.

44. (Previously presented) The prosthesis of claim 43, wherein the thickness of the cross-linked UHMWPE of the acetabular cup is between about 1 mm to about 5 mm.

45. (Previously presented) The prosthesis of claim 43, wherein the thickness of the cross-linked UHMWPE of the acetabular cup is between about 5 mm to about 8 mm.

46. (Previously presented) The prosthesis of claim 43, wherein the thickness of the cross-linked UHMWPE of the acetabular cup is between about 8 mm to about 10 mm.

47. (Previously presented) The prosthesis of claim 43, wherein the thickness of the cross-linked UHMWPE of the acetabular cup is between about 10 mm and about 20 mm.

48. (Previously presented) The prosthesis of claim 43, wherein the ball head diameter is between about 35 mm to about 40 mm.

49. (Previously presented) The prosthesis of claim 43, wherein the ball head diameter is between about 40 mm and about 70 mm.

50. (Previously presented) The prosthesis of claim 43, wherein the ball head diameter is between about 70 mm and about 90 mm.

51. (Previously presented) The prosthesis of claim 43, wherein θ_{\max} is about 60° to about 90° .

52. (Previously presented) The prosthesis of claim 43, wherein θ_{\max} is about 60° to about 70° .

53. (Previously presented) The prosthesis of claim 43, wherein the bearing portion has a rim chamfer having an angle θ_c which is substantially equal to θ_{\max} .

54. (Previously presented) The prosthesis of claim 43, wherein the cross-linked UHMWPE of the acetabular cup has a storage modulus of about 1 MPa to about 850 MPa.

55. (Previously presented) The prosthesis of claim 43, wherein the cross-linked UHMWPE of the acetabular cup has a contact stress of about 10 MPa.

56. (Previously presented) The prosthesis of claim 43, wherein depth of the cavity is about 16 mm.

57. (Previously presented) The prosthesis of claim 43, wherein the bearing portion defines a sphere segment cavity and said mating portion is a ball head.

58. (Previously presented) The prosthesis of claim 57, wherein the sphere segment is a hemisphere.

59. (Previously presented) The prosthesis of claim 57, wherein the sphere segment defines less than a hemisphere in all directions of motion.

60. (Previously presented) The prosthesis of claim 57, wherein the sphere segment defines less than a hemisphere in a selected direction of motion and a hemisphere in another direction of motion.

61. (Previously presented) The prosthesis of claim 43, wherein the ball head comprises of material selected from a group consisting of: polymer, metal, and ceramic.

62. (Previously presented) The prosthesis of claim 43, wherein the head is spherical.

63. (Previously presented) The prosthesis of claim 43, wherein the head is ovoid.

64. (Previously presented) The prosthesis of claim 57, wherein the mating portion comprises a prosthetic ball member to be attached to the femur.

65. **(Currently amended)** A hip joint prosthesis comprising:

a. a metallic acetabulum shell, wherein the shell can be fixed to the pelvis to be disposed to be in contact with an acetabular cup; and

b. **[[an]] a cross-linked UHMWPE acetabular cup to embrace a femur cup or a ball head, wherein the acetabular cup comprises that includes a load bearing portion ~~and can embrace a femur cup or a ball head~~, wherein the acetabular cup comprises wear resistant cross-linked UHMWPE that resists embrittlement, wherein the thickness of the cross-linked UHMWPE of the acetabular cup is about 1 mm to about 20 mm, and wherein the acetabular cup or the femur cup can accommodate a ball head having a diameter about 35 mm to about 90 mm and which has a radius of curvature complementary to the cavity in the acetabular cup or the femur cup.**

66. (Previously presented) The prosthesis of claim 65, wherein the thickness of the cross-linked UHMWPE of the acetabular cup is between about 1 mm to about 5 mm.

67. (Previously presented) The prosthesis of claim 65, wherein the thickness of the cross-linked UHMWPE of the acetabular cup is between about 5 mm to about 8 mm.

68. (Previously presented) The prosthesis of claim 65, wherein the thickness of the cross-linked UHMWPE of the acetabular cup is between about 8 mm to about 10 mm.

69. (Previously presented) The prosthesis of claim 65, wherein the thickness of the cross-linked UHMWPE of the acetabular cup is between about 10 mm and about 20 mm.

70. (Previously presented) The prosthesis of claim 65, wherein the cross-linked UHMWPE of the acetabular cup has a storage modulus of about 1 MPa to about 850 MPa.

71. (Previously presented) The prosthesis of claim 65, wherein the cross-linked UHMWPE of the acetabular cup has a contact stress of about 1 MPa to about 10 MPa.

72. (Previously presented) The prosthesis of claim 65, wherein depth of the cavity is about 16 mm.

73. (Previously presented) The prosthesis of claim 65, wherein the acetabular cup defines an internal diameter that accommodates a ball head having a diameter between about 35 mm to about 40 mm.

74. (Previously presented) The prosthesis of claim 65, wherein the acetabular cup defines an internal diameter that accommodates a ball head having a diameter between about 40 mm and about 70 mm.

75. (Previously presented) The prosthesis of claim 65, wherein the acetabular cup defines an internal diameter that accommodates a ball head having a diameter between about 70 mm and about 90 mm.

76. (Previously presented) The prosthesis of claim 65, wherein the acetabular cup can embrace a femur cup defines an internal diameter that accommodates a ball head having a diameter between about 35 mm to about 40 mm.

77. (Previously presented) The prosthesis of claim 65, wherein the acetabular cup can embrace a femur cup defines an internal diameter that accommodates a ball head having a diameter between about 40 mm and about 70 mm.

78. (Previously presented) The prosthesis of claim 65, wherein the acetabular cup can embrace a femur cup defines an internal diameter that accommodates a ball head having a diameter between about 70 mm and about 90 mm.

79. **(Currently amended)** A hip joint prosthesis assembly comprising:

a. a metallic acetabulum shell, wherein the shell can be fixed to the pelvis to be disposed to be in contact with an acetabular cup;

b. an a cross-linked UHMWPE acetabular cup to embrace a ball head, wherein the acetabular cup comprises that includes a load bearing portion~~[[,]]~~ and a mating portion, ~~and can embrace a ball head~~, wherein the cup comprises wear resistant cross-linked UHMWPE that resists embrittlement, and wherein the thickness of the cross-linked UHMWPE of the acetabular cup is about 1 mm to about 5 mm; and

c. a ball head which has a radius of curvature complementary to the cavity in the acetabular cup, wherein when the ball head can be embraced by the said acetabular cup to form an articulation to provide motion such that θ_{\max} is about 60° to about 135° , and wherein the head diameter is about 35 mm to about 70 mm.

80. (Previously presented) The prosthesis assembly according to claim 79, further comprises an attachment assembly for attaching the said bearing portion to a patient, wherein the said attachment assembly is selected from a group of materials comprising bone cement, a metal shell, or a combination of bone cement and a metal shell.

81. **(Currently amended)** The prosthesis assembly according to claim 79, wherein the ball head cross-section (HS) satisfies:

$$HS = SS - 2T_c - 2T_s - 2T_L, \text{ wherein}$$

SS is pelvic socket size of about 41 mm or more to accommodate a ball having a diameter of up to about 70 mm,

T_c is bone cement thickness,

T_s is shell thickness, **and**

T_L is polymer thickness.

82. (Previously presented) The prosthesis assembly of claim 81, wherein HS is about 28 mm when SS is about 44 mm.

83. (Previously presented) The prosthesis assembly of claim 81, wherein HS is about 32 mm when SS is about 43 mm.

84. (Previously presented) The prosthesis assembly of claim 81, wherein HS is about 45 mm when SS is about 55 mm.

85. (Previously presented) The prosthesis of claim 81, wherein θ_{max} is about 60° to about 135° when HS is about 35 mm to about 70 mm.

86. (Previously presented) The prosthesis assembly of claim 81, wherein T_c is between about 0 to about 6 mm.

87. (Previously presented) The prosthesis assembly of claim 81, wherein T_s is between about 0 to about 5 mm.

88. (Previously presented) The prosthesis assembly of claim 81, wherein T_L is between about 1 to about 5 mm.

89. **(Currently amended)** A hip joint prosthesis assembly comprising:

a. a metallic acetabulum shell, wherein the shell can be fixed to the pelvis to be disposed to be in contact with an acetabular cup; and

b. **[[an]] a cross-linked UHMWPE acetabular cup to embrace a femur cup or a ball head, wherein the acetabular cup comprises that includes a load bearing portion ~~and can embrace a femur cup or a ball head~~, wherein the acetabular cup comprises wear resistant cross-linked UHMWPE that resists embrittlement, wherein the thickness of the cross-linked UHMWPE of the acetabular cup is about 1 mm to about 20 mm, and wherein the acetabular cup or the femur cup can accommodate a ball head having a diameter about 35**

mm to about 90 mm which has a radius of curvature complementary to the cavity in the acetabular cup or the femur cup.

- 90. (Previously presented) A kit comprising a prosthesis assembly of claim 42.
- 91. (Previously presented) A kit comprising a prosthesis assembly of claim 79.
- 92. (Previously presented) A kit comprising a prosthesis assembly of claim 89.
- 93. (Previously presented) A method of implanting a hip joint prosthesis comprising:
 - a. determining socket size; and
 - b. implanting a prosthesis of claim 42.
- 94. (Previously presented) A method of implanting a hip joint prosthesis comprising:
 - a. determining socket size; and
 - b. implanting a prosthesis of claim 79.
- 95. (Previously presented) A method of implanting a hip joint prosthesis comprising:
 - a. determining socket size; and
 - b. implanting a prosthesis of claim 89.